THE year-book of the Michigan College of Mines, a pamphlet of 132 pages, accompanied by an atlas of views showing the methods pursued and the facilities for practical instruction afforded by the immediate surroundings, has been received. Established in 1885, and situated in the centre of the Lake Superior mining district, the college furnishes an excellent practical and theoretical training in mining and kindred subjects.

A COURSE of eight lectures on "The Carbohydrates and their Relations to Living Organisms" will be given in the physiology department of University College, University of London, by Dr. S. B. Schryver, on Wednesdays at 5 p.m., beginning on Wednesday, October 24. These lectures are open to all students of the University of London, also to qualified medical men on presentation of their cards, and to such other persons as are specially admitted.

A COURSE of four lectures on the "Phylogeny of the Higher Crustacea" will be given in the zoological lecture room of University College, London, by Dr. W. T. Calman, at 5 p.m., on Wednesdays during October and November, beginning on October 24. The lectures are for advanced students of the University and others interested in zoology. There is no fee for the course; cards of admission may be obtained on application to Mr. P. J. Hartog, academic registrar of the University.

AT the opening of the winter session at St. Andrews University on October 12, Principal Donaldson announced that the Lord Rector, Mr. Carnegie, has offered 10,000*l.* to build such an addition to the University library as will provide ample space for all the books of the University, and a room where students can read with perfect quiet and with easy access to whatever they may require. Mr. Carnegie has also promised a donation of 11,500*l.* for a physical laboratory at University College, Dundee.

ACCORDING to *Science*, improvements have been made during the summer at Cornell University which will greatly strengthen the scientific work. New and enlarged quarters have been provided for the engineering department and the departments of geology, physics, and biology. Quantitative and organic laboratories have been provided for the chemical department. A large amount of apparatus has been secured for the different subjects. By the death of the sister of the late Mr. W. W. Guiteau, the University will receive the legacy left by him, said to amount to between 20,000*l.* and 40,000*l.*

THE Board of Education, South Kensington, has issued the following list of candidates successful in the competition for the Whitworth scholarships and exhibitions, 1906:—(1) *Scholarships (tenable for three years), 125l. a year each*:—Frederick G. Turner, London; William E. Hogg, London; Sidney G. Winn, London; Samuel Lees, Manchester.—(2) *Exhibitions (tenable for one year), value 50l.*:—William F. Cobbett, Gosport; William H. Mead, Southsea; Arthur Williams, Brymbo, Wrexham; James Bradley, Hollinwood, Lancs; George E. Morgan, Portsmouth; Albert C. H. Connor, Gillingham, Kent; Edgar J. Mitchell, Devonport; George O. Dawe, Devonport; Ernest Bate, London; Henry W. Turner, Portsmouth; William H. C. Coombe, Devonport; Edwin M. Vigers, London; Ronald E. Widdecombe, Saltash; Frederick R. Rogers, Devonport; Frank H. Cothay, Sunderland; Sidney Vernon, Abbey Wood, Kent; Frank R. Bloor, Gillingham, Kent; George W. Burley, Meersbrook, Sheffield; Robert James, Pembroke Dock; Sidney C. Gladwyn, London; Frederick C. Worton, London; John Airey, Bradford, Yorks; Charles A. Wright, Preston; William G. Weaver, Brighton; William E. Stokes, London; Thomas B. Bardo, Sheerness; Alfred Bailey, Oldham; John S. Buchanan, Cambuslang, Glasgow; Albert E. Palmer, Sunderland; Henry W. Maskell, London.

THE following list of successful candidates for Royal exhibitions, national scholarships, and free studentships (science) has just been issued by the Board of Education, South Kensington:—*Royal Exhibitions*: Walter H. Stock, Swindon; John M. Robertson, Pembroke Dock; John C. Nixon, Southsea; Thomas W. Page, Ipplepen, Newton Abbot; Charles A. Brearley, Halifax; William F. Cobbett, Gosport; Herbert Schofield, Halifax. *National Scholarships for Mechanics*:—Henry S. Rowell, West Benwell, Newcastle-on-Tyne; Joseph J. Brooks, Devonport; Albert C. H. Connor, Gillingham, Kent; Frederick Hickey, Southsea; William H. Mead, Southsea. *Free Studentships for Mechanics*:—Arthur C. Lowe, Harrogate; Frank R. Bloor, Gillingham, Kent; John Airey, Bradford, Yorks. *National Scholarships for Physics*:—Douglas V. Plumbridge, Isleworth; Andrew McCance, Glasgow; Thomas Royds, Oldham; Henry J. Lomax, Darwen; John N. Brown, London. *Free Studentship for Physics*:—Edward F. Pattenden, Whitstable. *National Scholarships for Chemistry*:—Arthur Bramley, Elland, Yorks; Harold W. Atkinson, New Mills, Stockport; Fred Bridge, Burnley; William A. Naish, Handsworth, Birmingham; Norman M. Comber, Brighton; Percy G. Ward, Brighton. *Free Studentship for Chemistry*:—Henry V. A. Briscoe, London. *National Scholarships for Biology*:—Rowland M. Richards, Manningham, Bradford; James H. Orton, Bradford, Yorks; Katie Barratt, Swanley, Kent. *Free Studentship for Biology*:—James L. Thompson, London. *National Scholarships for Geology*:—Abraham Haworth, Burnley; Arthur T. Cundy, Redruth; Ernest Lee, Burnley.

AT the distribution of prizes at the Royal Technical Institute, Salford, on October 11, Mr. H. B. Knowles, the principal, read an encouraging report. Speaking of the value of the training given in day technical schools, he said:—"It may be that a youth who has left school at the earliest moment allowed by the law will at the age of seventeen or eighteen have secured a position better paid than the one a student obtains immediately on leaving technical day classes, although in many cases the training received has given immediate access to a career which would otherwise have been inaccessible. The proper time for such a comparison would, however, be some half-dozen years after; and I have weighty reasons for my confidence that then it would be found that the two or three years spent in technical departments had been in every respect a most profitable investment." The principal also directed attention to two important developments in connection with the Salford arrangements for the current session. First, the correlation between the work at the institute and the work in evening schools has been made more real by the stipulation that all applicants for admission to the institute under sixteen years of age shall, before admission, pass an examination in English and mathematics. Secondly, courses of instruction suitable for students occupied in the various trades, and extending over four or five years, have been arranged on the basis of attendance at classes on three evenings per week. An added inducement to take these courses has been offered by making the fee for a course small as compared with the fees for the individual classes constituting the course. A great improvement in the quality of much of the work is expected as a result of this arrangement.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, February 15.—"Observations on the Labyrinth of Certain Animals." By Dr. Albert A. **Gray**.

The labyrinths of six animals were examined, and the conditions found may be summarised as follows:—The labyrinth of the lion presents the usual features of the Carnivora. The cochlea is of the sharp-pointed type, and there is hardly any evidence of a perilymph space in the semicircular canals. The Indian gazelle has a cochlea of a flat type, and there is a trace of a perilymph space in the canals. In the three-toed sloth the cochlea is of a flat type. The canals are almost square, and the perilymph space is well marked. The labyrinth of the wallaby is like that of the ungulates, but two large otoliths are present in the vestibule.

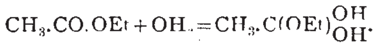
Among the birds the ostrich is peculiar, owing to the fact that there is no communication between the posterior and superior canals at the point at which they cross. The cochlea is also very short. The crested screamer has a relatively long cochlea, and the superior canal droops somewhat backwards.

May 10.—"The Mechanism of Carbon Assimilation in Green Plants: the Photolytic Decomposition of Carbon Dioxide *in vitro*. By F. L. **Usher** and J. H. **Priestley**.

For summary of this paper see NATURE of October 11 (p. 604).

June 14.—"Studies on Enzyme Action. Lipase, II." By Prof. Henry E. **Armstrong**, F.R.S., and Dr. Ernest **Ormerod**.

Inasmuch as the ethereal salts which are hydrolysed under the influence of lipase are all compounds of the type R′.CO.OX′, it cannot well be supposed, as R′ and X′ may be varied within wide limits, that the selective action of the enzyme is exercised with reference either to R′ or to X′: consequently the controlling influence must be attributed to the carboxyl radicle (CO.O); the enzyme must be so constituted that it can "fit itself to this group." The problem to be solved is—why should ethereal salts derived from the lower terms of the acetic series be so much less readily hydrolysed than the higher? The differences in stability do not account for the differences in behaviour of homologous salts; in fact, ordinary hydrolytic agents appear to act more readily on the lower terms. Nor can the difference be attributed to the destruction of the enzyme by the acid which is liberated from the salt, as this destructive effect can be avoided by diluting the solutions to the necessary extent. Their experiments have led the authors to form the provisional hypothesis that the hydrolysis of the ethereal salt by lipase involves the direct association of the enzyme with the carboxyl centre and that such association may be prevented by the "hydration" of this centre: consequently, that those salts which are the more attractive of water will be the less readily hydrolysed. The facts generally seem to be in accordance with this view, inasmuch as the solubility in water of ethereal salts diminishes as the series is ascended; salts such as ethylic formate and acetate undoubtedly tend to form hydrates (hydrols) in solution, such as



$$CH_3.CO.OEt + OH_2 = CH_3.C(OEt)\begin{matrix}OH\\OH\end{matrix}.$$

A noteworthy result in harmony with the view is the fact that ethylic malate is but slowly acted upon by lipase in comparison with ethylic succinate and that ethylic tartrate is practically unaffected. The explanation of the differences to be observed between animal and vegetable lipase is probably to be sought for rather in differences in their emulsifying power than in peculiarities inherent in the lipoclast. The main difficulty the investigation presents lies in securing uniform conditions; if an effective comparison is to be made between ethereal salts, it is an essential condition of success that the substances compared be in solution. Peculiar difficulties are encountered on this account in studying the action of lipase from various sources on fatty substances.

June 21.—"Ionic Velocities in Air at different Temperatures." By P. **Phillips**. Communicated by Prof. J. J. Thomson, F.R.S.

The object of this paper is to find at different temperatures the velocity in an electric field of the ions produced by Röntgen rays in air at atmospheric pressure. The method used for determining the velocities is that devised by Langevin in 1902, and published in his "Recherches sur les Gaz ionisées," Paris, 1902.

The general arrangement of the apparatus is very little different from that used by Langevin, the only serious difference being that the vessel containing the electrodes is made so that it may be immersed in baths at different temperatures.

The velocities have been found at temperatures ranging from $-179°$ C. to $+138°$ C., and the following are the values of k_1 and k_2, the velocities of the $+ve$ and $-ve$ ions under a field of one volt per centimetre:—

k_1	k_2	Temp., abs. °
2 00	2·495	411
1·95	2·40	399
1·85	2·30	383
1·81	2·21	373
1·67	2·125	348
1·60	2 00	333
1·39	1·785	285
0·945	1·23	209
0·235	0·235	94

When k_1 and k_2 are plotted against the temperature we see that between the temperatures 209° and 411° k_1 and k_2 seem to be proportional to the absolute temperature, but at 94° k_1 and k_2 seem to be equal, and much smaller than would be given by this linear law.

Making use of the kinetic theory of gases, we can arrive at the following expression for k_1 and k_2:—

$$k = \tfrac{1}{2}X\frac{e\lambda}{mv}\left[\frac{4\sqrt{2}}{n\left(1+n^{\frac{1}{3}}\right)^2\left(1+\frac{1}{n}\right)^{\frac{1}{2}}}\right],$$

where X is the field in absolute units, e the charge on the ion, λ the mean free path of a molecule, m the mass of a molecule, v the mean molecular velocity of the molecule, and n the number of molecules in an ion. Making use of the values of k_1 and k_2 given above, we obtain the following values of n_1 and n_2:—

Temp., abs	n_1	n
94	4·63	4·63
209	2·12	1·82
285	1·76	1·43
348	1·64	1·34
411	1·52	1·25

When n_1 and n_2 are plotted against the temperature they show a very rapid increase as the temperature of liquefaction of air is approached. This is what might be expected, as the ions in a vapour near its liquefaction temperature are usually large. At the upper temperature the curve shows no very marked tendency, so that it is difficult to predict what might happen at a higher temperature.

The fact that n varies continuously, and not in jumps, would seem to show that there is a continual exchange going on between ions and uncharged molecules; at some collisions several molecules remain attached to the ion, while at others one or more of them is knocked off, and so a dynamical equilibrium is set up. As the temperature of the gas rises, the collisions are more violent, and, statistically, fewer molecules are attached to an ion; this gradual change would go on until the collisions became so violent that at times corpuscles would be shot off without even a single molecule attached to them. When this happened the velocity of the ion would very rapidly increase with the temperature, and so we might expect in flames those very rapidly moving ions which consist of single unloaded corpuscles for an appreciable fraction of their existence.

"Note on Opalescence in Fluids near the Critical Temperature." By Prof. Sydney **Young**, F.R.S.

The experiments described by Travers and Usher were mostly carried out at constant volume, the temperature being raised very slowly. In the author's experiments the substance was kept at its critical temperature, and the volume altered by equal stages. The tubes employed were much narrower. Where comparison is possible the observations confirm those of Travers and Usher, and the following generalisations may be deduced from them:—(1) When observations were made during compression no opalescence was visible until a definite volume was reached: opalescence then appeared at the bottom of the tube, that is to say, just over the mercury; on further compression the opalescence or mist became denser, and extended further up the tube; near the critical volume the mist was very dense, especially near the middle; continuing to compress, the mist disappeared below, but became dense above; the clear part extended upwards, and the mist finally disappeared at the top of the tube. When observations were made during expansion the phenomena were very similar, except that the mist was usually lower down in the tube. (2) The limits of volume between which mist was visible were much the same for the four paraffins examined, about 1·17 or 1·18 to 0·87 or 0·88 (critical volume = 1·00). (3) At slightly higher temperatures the mist was much less dense and the range of volume more restricted. It seems probable that the position of maximum opalescence depends on the volume, but further investigation is desirable.

June 28.—"The Alcoholic Ferment of Yeast-juice. Part ii.—The Coferment of Yeast-juice." By Dr. Arthur **Harden** and W. J. **Young.** Communicated by Dr. C. J. Martin, F.R.S.

Experiments have been made on the nature of the dialysable, thermostable substance contained in yeast-juice, upon the presence of which the fermentation of glucose by yeast-juice depends, and to which the name coferment is provisionally applied. The inactive residue, obtained by filtration of yeast-juice through a Martin gelatin filter, has been prepared in a solid form, which is quite inactive when dissolved in glucose solution, but is rendered active by the addition of filtrate or of boiled yeast-juice. This solid retains its potential activity for a considerable time. When a *small* quantity of boiled yeast-juice is added to a solution of this inactive residue in 10 per cent. glucose, fermentation commences, and continues for a period varying with the amount of boiled juice added. The cessation of fermentation appears to be due to a change in the coferment, since the addition of a further quantity causes a repetition of the phenomenon.

PARIS.

Academy of Sciences, October 1.—M. H. Poincaré in the chair.—Remarks by M. **Berthelot** on his work entitled "Traité pratique de l'Analyse des Gaz."—Some new examples of Rosaceæ containing hydrocyanic acid: L. **Guignard.** In addition to the plants mentioned by the author in earlier papers on this subject, the names of twenty additional genera are given from which hydrocyanic acid has been obtained. The earlier experiments have also been made quantitative, and it has been found that the amounts of the acid obtainable depend on the age of the organs of the plant. The leaves nearly always furnish the highest proportion of prussic acid, and in certain cases the proportion is nearly as high as that given by the leaves of the cherry laurel.—The ravages of *Loxostega* (*Eurycreon*) *sticticalis* in the cultivation of beet-root of the Central Plateau: Alfred **Giard.** For some years this parasite has been well known in North America as a dangerous enemy of the beet. More recently it has caused great damage to beet culture in Russia, but France has hitherto escaped this pest. This year, possibly owing to the unusual dryness, it has taken firm hold of some regions of the Midi, in some districts more than 90 per cent. of the roots being affected. The author describes in detail the measures necessary to eradicate the parasite.—The periodic trajectories of electric corpuscles in space under the influence of terrestrial magnetism, with application to the magnetic perturbations: Carl **Störmer.**—The constituents of the alloys of manganese and molybdenum: G. **Arrivaut.** The preparation of alloys rich in molybdenum is difficult in the furnace, but easy when a suitable mixture of the oxides is reduced with aluminium. From the ingots thus obtained the compounds Mn_2Mo, MnMo, and $MnMo_2$ have been isolated.—Syntheses in the quinoline series. Dihydrophenylnaphthoquinoline dicarboxylic ester and its derivatives: L. J. **Simon** and Ch. **Mauguin.**—The existence of stable yeast forms in *Sterigmatocystis versicolor* and in *Aspergillus fumigatus*, and the pathogenic nature of the yeast derived from the latter type: G. **Odin.**—The "*fenêtre*" of the Plan-du-Nette and the geology of Haute-Tarentaise: W. **Kilian.**—A leakage between impermeable zones in calcareous subsoils: E. A. **Martel.**

DIARY OF SOCIETIES.

THURSDAY, OCTOBER 18.

CHEMICAL SOCIETY, at 8.30.—Presentation of the Longstaff Medal to Prof. W. Noel Hartley.—The Amino-dicarboxylic Acid derived from Pinene: W. A. Tilden and D. F Blyther.—The Preparation and Properties of Dihydropinylamine (Pinocamphylamine): W. A. Tilden and F. G. Shepheard.—Determination of Nitrates: F. S. Sinnatt.—The Nature of Ammoniacal Copper Solutions: H. N. Dawson.—Malacone, a Silicate of Zirconium containing Argon and Helium: S. Kitchen and W. G. Winterson.—The Relationship of Colour and Fluorescence to Constitution, Part i., The Condensation Products of Mellitic and Pyromellitic Acids with Resorcinol: O. Silberrad.—The Colouring Matters of the Stilbene Group, Part. iii.: A. G. Green and P. F. Crosland.—(1) Separation of αα- and ββ′-Dimethyladipic Acids; (2) Action of Alcoholic Potassium Hydroxide on 3-Bromo-1 : 1-Dimethyl-hexahydrobenzene: A. W. Crossley and N. Renouf.—(1) The Compounds of Pyridine with Dichromates; (2) The Normal Chromates and the Unsaturated Character of the Chromate Radical: S. H. C. Briggs.—(1) Interaction of Succinic Acid and Potassium Dichromate, Note on a Black Modification of Chromium Sesquioxide; (2) Derivatives of Polyvalent Iodine; the Action of Chlorine on Organic Iodo-derivatives, including the Sulphonium and Tetra-substituted Ammonium Iodides: E. A. Werner.—(1) New Derivatives of Diphenol (4-4′-Dihydroxydiphenyl); (2) The so-called "Benzidine Chromate" and Allied Substances: J. Moir.—The Interaction of the Alkyl Sulphates with the Nitrites of the Alkali Metals and Metals of the Alkaline Earths: P. C. Rây and P. Neogi.

INSTITUTION OF MINING AND METALLURGY, at 8.—The Auriferous Rocks of India, Western Australia, and South Africa; M. Maclaren.—Sand Sampling in Cyanide Works: D. Simpson.—Treatment of the Precipitate and Manipulation of the Tilting Furnaces at the Redjang-Lebong Mine, Sumatra: S. J. Truscott.—A Combined Air and Water Spray: T. White.

FRIDAY, OCTOBER 19.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—*Discussion:* Railway-motor-car Traffic: T. H. Riches and S. B. Haslam.—*Paper:* Some Notes on the Mechanical Equipment of Collieries: E. M. Hann.

SATURDAY, OCTOBER 20.

ESSEX FIELD CLUB (at Epping).—Annual Fungus Foray—all day Meeting.—The Ecology of Fungi: George Massee.

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